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# खनिज मिश्रण, पशु आहार का पूरक — विशिष्टि

*( चौथा पुनरीक्षण )*

*Indian Standard*

# MINERAL MIXTURES FOR SUPPLEMENTING CATTLE FEEDS — SPECIFICATION

*( Fourth Revision )*

ICS 65.120

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**BUREAU OF INDIAN STANDARDS**
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*May* 2002

**Price Group 3**

Livestock Feeds Sectional Committee, FAD 5

## FOREWORD

This Indian Standard ( Fourth Revision ) was adopted by the Bureau of Indian Standards, after the draft finalized by the Livestock Feeds Sectional Committee had been approved by the Food and Agriculture Division Council

Minerals play many important functions in the body and the vital processes in a living organism are dependent on the presence of various minerals in proper proportion Hence, to ensure optimum health and productivity in livestock, it is essential to provide these minerals, whenever necessary, in adequate quantity and proportion It is expected that this standard will help in the manufacture of mineral mixtures of the required quality for supplementing ration of livestock directly or through cattle feeds

This standard was first issued in 1960 when it was based on Patent No 57437 for mineral supplements for cattle obtained by the then Ministry of Food, Agriculture, Community Development and Cooperation, Government of India To allow the use of other ingredients and also with a view to making the standard widely adaptable, the first revision was issued in 1968 In the first revision, a provision was made for the manufacture of mineral mixtures without salt

The third revision of the standard was brought out with a view to updating the levels of supplements to ensure that the minerals requirements for cattle are met To take care of the deficiency of magnesium in diets of livestock, magnesium was included as a supplement by reducing levels of calcium to some extent In view of the fact that the levels of 0 03 and 0 04 percent fluorine in Type 1 and Type 2 mineral mixtures respectively cannot be maintained, and cattle are able to withstand higher levels, the fluorine levels were accordingly raised, keeping the safe limits in view The limits for zinc and cobalt were also increased

In view of growing concern against the use of bovine origin ingredients as supplements to ruminants, the fourth revision of the standard was considered necessary Besides, sulphur being an important mineral element, which was not included in the mineral mixture so far, and forages being low in sulphur content, its inclusion has been considered In view of its higher requirements and low levels in forages, level of zinc in mineral mixture has been further increased To accommodate these elements and for creating provisions for overages, calcium and magnesium levels have been marginally reduced However phosphorus level remains unchanged, thereby highly bio available source of calcium and phosphorus remain unchanged The list of sources of different mineral supplements has also been reviewed

In preparation of this standard considerable assistance have been received from Dr Mangat Ram Garg of National Dairy Development Board, Anand

The Composition of the Committee responsible for formulation of this standard is given in Annex C

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 1960 'Rules for rounding off numerical values ( *revised* )' The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard

# *Indian Standard*

# MINERAL MIXTURES FOR SUPPLEMENTING CATTLE FEEDS — SPECIFICATION

## *( Fourth Revision )*

## 1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for mineral mixtures for supplementing cattle feeds

## 2 REFERENCES

The following Indian Standards contain provisions which through reference in this text constitute provision of this standard At the time of publication, the editions indicated were valid All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below

| *IS No* | *Title* |
|---|---|
| 296 1986 | Specification for sodium carbonate anhydrous ( *third revision* ) |
| 460 ( Part 1 ) 1985 | Specification for test sieves Part 1 Wire cloth test sieves ( *third revision* ) |
| 920 1972 | Specification for common salt cattle licks for animal consumption ( *first revision* ) |
| 1767 1980 | Dicalcium phosphate for dentifrice ( *second revision* ) |
| 5470 2002 | Specification for dicalcium phosphate, animal feed grade ( *first revision* ) |
| 7874 | Methods of test for animal feeds and feeding stuffs |
| ( Part 1 ) 1975 | General methods |
| ( Part 2 ) 1975 | Mineral and trace elements |
| ( Part 3 ) 1975 | Microbiological methods |
| 13433 ( Part 1 ) 1992 | Animal feeds and feeding stuffs Determination of calcium Part 1 Titrimetric method |
| 13574 1992 | Animal feed and feeding stuffs — Determination of calcium and magnesium in mineral supplements |
| 14828 2000 | Determination of total phosphorus content — Spectrophotometric method |
| 15121 2002 | Animal feeding stuff — Determination of the contents of calcium, copper, iron, magnesium, manganese, potassium, sodium and zinc — Method using atomic absorption spectrometry |

## 3 TYPES

Mineral mixtures for supplementing cattle feeds shall be of the following two types

*Type* 1 — Mineral mixtures containing salt

*Type* 2 — Mineral mixtures without salt

## 4 INGREDIENTS

Any of the ingredients given in Annex A shall be used for the preparation of mineral mixtures All ingredients used shall be suitable for cattle's consumption and shall contain no substances harmful to cattle Animal origin material shall not be used

## 5 DESCRIPTION

The material shall be free flowing powder, and free from adulterants, insect, visible fungus infestation and undesirable odour

## 6 REQUIREMENTS

**6.1** The material shall pass more than 70 percent by mass and 90 percent by mass through 200 micron IS Sieve [ *see* IS 460 ( Part 1 ) ] in case of Type 1 material, and Type 2 material respectively

**6.2** The material shall be free from spores of *Bacillus anthracis Clostridium* sp when tested by the method described in 4 5 and 6 of IS 7874 ( Part 3 )

**6.3** Mineral mixtures shall also conform to the requirements given in Table 1

## 7 PACKING AND MARKING

### 7.1 Packing

The mineral mixture shall be packed in moisture-proof bags, cartons, boxes or drums All containers shall be sound, clean and free from causal agents of infectious diseases and parasites

### Table 1 Requirements for Mineral Mixtures for Supplementing Cattle Feeds

( *Clause* 6.3 )

| Sl No | Characteristic | Requirement | | Method of Test, Ref to |
|---|---|---|---|---|
| | | Type 1 | Type 2 | |
| (1) | (2) | (3) | (4) | (5) |
| i) | Moisture percent by mass, *Max* | 5 | 5 | Annex A of IS 5470 |
| ii) | Calcium percent by mass *Min* | 16 | 20 | IS 15121 or<br>IS 13433 ( Part 1 ) or<br>IS 13574 |
| iii) | Phosphorus percent by mass, *Min* | 9 | 12 | [2]IS 14828 or Cl 6 of<br>IS 7874 ( Part 2 ) |
| iv) | Magnesium percent by mass *Min* | 4 | 5 | [1]IS 15121 or<br>IS 13574 |
| v) | Salt ( chlorine as NaCl ), percent by mass, *Min* | 22 | — | 4 of IS 7874 ( Part 2 ) |
| vi) | Iron, percent by mass, *Min* | 0.3 | 0.4 | IS 15121 |
| vii) | Iodine ( as KI ) percent by mass, *Min* | 0.020 | 0.026 | 8 of IS 7874 ( Part 2 ) |
| viii) | Copper percent by mass, *Min* | 0.078 | 0.100 | IS 15121 |
| ix) | Manganese percent by mass, *Min* | 0.10 | 0.12 | IS 15121 |
| x) | Cobalt percent by mass, *Min* | 0.009 | 0.012 | 11 of IS 7874 ( Part 2 ) |
| xi) | Fluorine percent by mass *Max* | 0.05 | 0.07 | Annex B of IS 5470 |
| xii) | Zinc percent by mass *Min* | 0.64 | 0.80 | IS 15121 |
| xiii) | Sulphur percent by mass | 1.4-2.3 | 1.8-3.0 | Annex B of this standard |
| xiv) | Acid insoluble ash percent by mass *Max* | 2.4 | 3.0 | 10 of IS 7874 ( Part 1 ) |
| xv) | Lead ( as Pb ) mg/kg *Max* | 16 | 20 | A-7 of IS 1767 |
| xvi) | Arsenic ( as $As_2O_3$ ), mg/kg *Max* | 5 | 7 | A-6 of IS 1767 |
| xvii) | Total ash, in moisture free sample, percent by mass | 81-88 | 78-85 | Annex C of IS 5470 |
| xviii) | Presence of proteinous/organic impurities | Shall pass the test | Shall pass the test | Annex D of IS 5470 |

NOTE — The values for requirements given in Sl No (ii) to (xvii) are on moisture-free basis

[1] In case of dispute, the method given in IS 15121 shall be the referee method

[2] In case of dispute, the method given in IS 14828 shall be the referee method

## 7.2 Marking

**7.2.1** Each container shall be marked or labelled giving the following information

a) Name and type of the material,

b) Name of the manufacturer,

c) Batch or Code number, and

d) Net mass in kg

**7.2.2** Each container shall also be marked with the following information This may be done by enclosing a leaflet in each container

a) Name and type of the material,

b) Ingredients,

c) Guaranteed composition, and

d) Directions for use ( in case of Type 2 mineral mixtures the quantity of salt required to be added before use shall also be indicated )

**7.2.3** The product may also be marked with the Standard Mark

**7.2.3.1** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards

## 8 SAMPLING

Representative samples of the material for testing its conformity to this specification shall be drawn according to the method prescribed in Annex E of IS 5470

# ANNEX A

( *Clause* 4 )

## INGREDIENTS FOR MINERAL MIXTURES

A-1 The following are the ingredients that shall be used for compounding mineral mixtures

1 Calcium carbonate
2 Ground limestone ( with low magnesium content )
3 Calcite powder
4 Dolomite limestone
5 Oyster shell grit
6 Dicalcium phosphate ( conforming to IS 5470 )
7 Magnesium carbonate
8 Magnesium oxide (calcined magnesite)
9 Manganous sulphate ( dried/monohydrate )
10 Zinc carbonate
11 Zinc chloride
12 Zinc sulphate ( dried/monohydrate )
13 Potassium iodide ( stabilized )
14 Sodium iodide
15 Potassium iodate
16 Calcium iodate
17 Cupric sulphate
18 Cupric chloride
19 Cobalt sulphate
20 Cobalt chloride
21 Common salt ( *see* IS 920 )
22 Sodium thiosulphate ( anhydrous )
23 Ferrous sulphate ( dried/monohydrate )

# ANNEX B

[ *Table* 1, *Sl No* (xiii) ]

## DETERMINATION OF SULPHUR

### B-1 APPARATUS

**B-1.1 Magnetic Stirrer**

**B-1.2 Spectrophotometer**

**B-1.3 Measuring Spoon ( 0.2 to 0.3 ml )**

**B-1.4 250-ml Flasks**

**B-1.5 Stirring Bars**

### B-2 REAGENTS

**B-2.1 Conditioning Solution**

Mix 50 ml glycerol with a solution containing 30 ml concentrated HCl, 300 ml distilled water, 100 ml ethyl alcohol ( 95 percent ) and 75 g sodium chloride

**B-2.2 Barium Chloride** — A R grade crystals

**B-2.3 Standard Sulphur Solution**

Dissolve 5.438 g reagent grade potassium sulphate in 1 litre water to make a standard stock solution Dilute 10 ml of the stock solution to 100 ml. This solution contain 0.01 mg sulphur/ml

### B-3 PROCEDURE

Take 5 to 10 ml aliquot of HCl extract in a 250-ml flask and add water to bring the volume to 95 ml Add 5 ml of conditioning solution Place the flask on the magnetic stirrer and add a magnetic stirrer bar The stirring speed should be constant for each run While stirring add a spoonful of barium chloride crystals and stir for exactly 1 min Just after stirring measure the absorbance at 350 nm A blank in which no barium chloride is added is run parallel Prepare a suitable standard curve extending from 0 to 1 2 mg of sulphur per 100 ml solution

## B-4 CALCULATION

$$\text{Sulphur, percent by mass} = \frac{T \times V \times 100}{A \times W \times 1\,000}$$

where

$T$ = mg of sulphur in test sample,

$V$ = Volume of extract made,

$A$ = Aliquot taken, and

$W$ = Weight of sample, in g

# ANNEX C

( *Foreword* )

## COMMITTEE COMPOSITION

Livestock Feed Sectional Committee FAD 5

| *Organization* | *Representative(s)* |
|---|---|
| National Dairy Development Board Anand | Dr Amrita Patil ( ***Chairperson*** )<br>Dr M R Garg ( *Alternate* ) |
| Godrej Soaps Ltd Mumbai | Dr S L Anaokar<br>Shri P N Narkhede ( *Alternate* ) |
| Central Institute for Research on Buffaloes Hissar | Dr T R Chauhan<br>Dr B S Punia ( *Alternate* ) |
| Mehsana Distt Cooperative Milk Producers Union Ltd Mehsana | Dr A H Joshi<br>Dr D P Parmar ( *Alternate* ) |
| *Indian Veterinary Research Institute Izatnagar* | *Prof* N N Pathak<br>Dr R C Kattiyar ( *Alternate* ) |
| Punjab State Cooperative Milk Producers Federation Ltd Chandigarh | Dr B M Mahajan<br>Shri A K Dhawan ( *Alternate* ) |
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| Punjab Agricultural University Ludhiana | Dr G S Makkar |
| Tamil Nadu Agriculture University Chennai | Dean |
| Poshak Feeds Karnal | Dr S S Zombade |
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| The Bharatiya Agro Industries Foundation Pune | Shri Ramesh Rawal |
| Indian Council of Agricultural Research New Delhi | Dr Arun Verma |
| National Dairy Research Institute Karnal | Dr C K Kurar |
| New Maharashtra Chakan Oils Mills Ltd Pune | Dr S V Vaidya<br>Dr M B Kumbhar ( *Alternate* ) |
| Gujarat Agriculture University Anand | Dr P M Talpada<br>Dr M C Desai ( *Alternate* ) |
| Central Avian Research Institute Izatnagar | Dr T S Johri<br>Dr A K Shrivastav ( *Alternate* ) |
| Central Drug Research Institute Lucknow | Shri P Y Gure |

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This Indian Standard has been developed from Doc No FAD 5 ( 1057 )

**Amendments Issued Since Publication**

| Amend No | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

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Printed at New India Printing Press Khurja India